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A Comparison of Cognitive Training and Response Cost Procedures in Modifying Cognitive Styles of Impulsive Children

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Self-control procedures with children can affect a number of behaviors (Karoly, 1977). Unfortunately, most of the studies have been conducted primarily in analog settings. Furthermore, self-control procedures have not been compared to externally administered programs.

The purpose of this study was to compare self-control training with an externally controlled program (response cost) in modifying cognitive styles of impulsive preschool children in an analog setting. The effects of both the response cost and self-control procedures also were examined in the children's classrooms. In contrast to previous studies a placebo control condition was utilized in which subjects received instructions, performed the training tasks, and received feedback; however, placebo subjects were not exposed to cognitive training strategies.

METHOD

Subjects

From the children in the 4- and 5-year-old groups in a Head Start program and a low-income housing preschool, 32 impulsive subjects were identified by the Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP)

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(Wright, Note 1). Age, sex, and race of subjects were equated across groups.

Materials

In the initial screening (pretest), posttest, and follow-up assessments the KRISP was administered individually and used as a measure of reflection-impulsivity. The KRISP is a 10 item matching-to-sample task. Number of errors was recorded.[2] A second measure was a group-administered classroom matching task consisting of 17 matching-to-sample items. For each item the child was instructed to circle the letter or figure which was identical to the standard. Number of errors was recorded. Cognitive training materials were 13 maze and 30 design copying tasks.

Procedure

Assessment. All children were individually administered the KRISP (Form A) by a naive experimenter. If an incorrect response was given the child was asked to choose another variant. After the child gave the correct response or made three errors on any item the experimenter began the next item. Reliability was obtained for all subjects.

At the time of the pretest KRISP administration all subjects were administered the classroom matching task. The children were tested by their teacher in their regular classrooms in groups of six to 11 children. All matching items were scored by one experimenter, with a second experimenter doing reliability checks on approximately 24% of the total items.

Treatment. Each subject was randomly assigned to one of four groups: (1) cognitive training (CT), (2) response cost (RC), (3) cognitive training plus response cost (CTRC), and (4) placebo control (PC).

CT. The procedure was similar to that described by Meichenbaum and Goodman (1971). Each subject was seen individually for one 30-minute session and four 20-minute sessions distributed over a 2 week period.

Three to 6 days after completion of the training procedure Form B of the KRISP was administered as Form A had been administered at pretest. The classroom matching task was completed as during the pretest. Two weeks following posttest, follow-up measures were taken on the KRISP

[2]Latencies were recorded throughout the study and reliability checks were conducted for one-third of the latency measures, resulting in a Pearson *r* of .98. However, latency measures were used only from the pretest for purposes of classifying children as impulsive, as Williams and Lahey (1977) have recently demonstrated that delays in response times are not associated with fewer errors in preschool children.

(Form A) and the classroom matching task as during the pretest and posttest measures.

RC. Subjects were seen for placebo training sessions corresponding in number and duration to the CT sessions. Each subject was exposed to the same training materials used in CT but with no CT instructions given. During each session the experimenter presented the child with the training materials, gave instructions, modeled the performance of items, asked the child to perform items, and gave feedback.

Three to 6 days following the final placebo training session the matching task and the KRISP (Form B) were administered. For the posttest administration of the KRISP a response cost contingency was in effect. Immediately before the KRISP was administered the subject was given either 12 pennies or a number of pennies corresponding to the number of pretest KRISP errors plus five, whichever was greater. Each subject was instructed that he/she would lose one penny for each error. Two weeks following the RC administration of the KRISP, the KRISP (Form A) was again administered under the same RC conditions. At posttest and follow-up the classroom matching task was administered under conditions identical to pretest.

CTRC. Cognitive training was administered as described for the CT group. Three to 6 days following completion of training the KRISP (Form B) was administered under RC conditions as described for the RC group. At that time the classroom matching task was readministered under pretest conditions. The classroom matching task and KRISP (Form A) were again administered after a 2 week period. The administration of the KRISP was again under RC conditions.

PC. Placebo training sessions were held as described for the RC group. Three to 6 days following the final placebo training session and again at the two week follow-up the classroom matching task and KRISP (Form B) were readministered in the standard pretest manner.

RESULTS

An item-by-item check resulted in a reliability of 100% on KRISP errors and the classroom matching task scores.

Mean KRISP errors for each group at pretest, posttest, and follow-up are presented in Table I. A 2 X 2 X 3 analysis of variance with two between-subject factors (cognitive training vs. no cognitive training; response cost vs. no response cost) and one within-subject factor (pretest vs. posttest vs. follow-up) was performed on the error data. The only significant effect was for the repeated measures factor ($F(2,56) = 39.16$, $p < .01$). A Newman-

Table I. Mean KRISP and Classroom Matching Task Errors for Each Experimental Group at Pretest, Posttest, and Follow-Up

	KRISP			Classroom matching task		
	Pretest	Posttest	Follow-up	Pretest	Posttest	Follow-up
Cognitive training						
Response cost (CTRC)	8.38	2.63	2.13	5.63	2.63	3.00
No response cost (CT)	8.88	3.63	3.63	6.63	4.38	4.13
Placebo training						
Response cost (RC)	8.13	3.75	3.13	5.88	4.88	4.13
No response cost (PC)	8.50	6.50	5.13	6.00	4.88	4.63

Keuls test indicated significant decreases in error rate from pretest to posttest and from pretest to follow-up ($p < .05$).

Mean errors on the classroom matching task for each group also are presented for pretest, posttest, and follow-up assessments in Table I. A 2 X 2 X 3 ANOVA indicated a significant effect for the repeated measures factor ($F(2,56) = 25.94$, $p < .01$); however, this effect was qualified by a significant cognitive training by repeated measures interaction ($F(2,56) = 3.16$, $p < .05$). A Newman-Keuls test was performed on pretest, posttest, and follow-up error means for each group receiving cognitive training (CT, CTRC) and not receiving cognitive training (RC, PC). Although no significant repeated measures effects existed for the groups not receiving cognitive training, both posttest and follow-up means for each group receiving cognitive training were significantly smaller than pretest means ($p < .05$).

DISCUSSION

The results indicate that KRISP errors decreased significantly from pretest to posttest regardless of the particular treatment employed. The placebo condition, which consisted of instructions, practice, and feedback, was effective in decreasing errors as was each of the three treatment conditions. Such findings suggest that some of the previous effects obtained in analog studies which were attributed to self-control training *may be* the result of instructions, practice, and feedback received during training. However, the small number of subjects per group prevents any definitive conclusion, particularly in view of the small pretest to posttest change in the placebo group relative to the change in the three treatment groups (see Table I).

Of importance was the sample of actual classroom behavior obtained in the form of error scores on the classroom matching task. Although it has

been demonstrated in one study (Bornstein & Quevillon, 1976) that cognitive training can produce increases in on-task behavior in the classroom, no one has previously demonstrated the effects of cognitive training on academic performance in a classroom setting.

The results of the classroom matching task suggest that a response cost procedure enhances the performance of preschool impulsive children only in the immediate situation in which it is implemented (i.e., analogous setting). In contrast, self-control training does result in changes in performance in settings different from the training situation (i.e., both the analog and classroom situations).

REFERENCE NOTE

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